

A HUMAN-CENTERED COMPUTING VIEW OF PLANETARY EXPLORATION

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Outline

- Project
- Perspective
- Participants
- Process
- Product

Project

- Human-Centered Computing view of the future (20 years +) of surface exploration of Mars and other planets
 - Human capability: no change
 - Science objectives: evolutionary changes
 - Technology: revolutionary changes

PERSPECTIVE

All exploration is human exploration.
We are not in a race with our machines.

Kenneth M. Ford
AAAI, 1999

Human-Centered Computing

Human-Centered Computing focuses on melding computer and human capabilities together into a system that synergistically exploits the capabilities and performance of each toward a specified goal or objective.

Mission Operations



HCC is characterized by:

- a “systems perspective”
- a deep understanding of cognitive, computational, and social elements of the task
- exploiting an understanding of human biology or psychology
- *in situ* performance evaluation

Aviation Safety



Decision Support Systems



Integrated Design Tools



Cognitive Prostheses

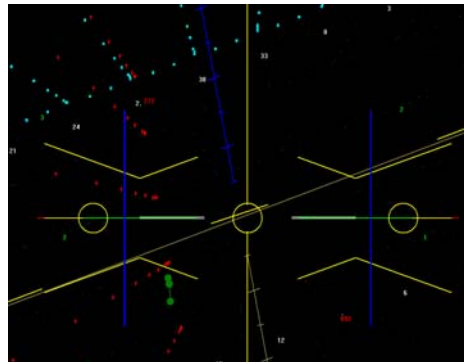
Human-Centered Computing can be understood as an effort to build *cognitive prostheses*, that is, computational systems that leverage and extend human intellectual and perceptual capacities.

~(Passing the Turing Test)

The aim is to build computational systems that amplify human intelligence rather than substitute for it...

...not *artificially* intelligent computers that would pass the Turing Test, but *actually* intelligent systems that wouldn't

OZ: A HUMAN CENTERED COCKPIT DISPLAY



Concept MAP Tools



■ Countries that are using the CMapTools

COMPUTER

Innovative Technology for Computer Professionals January 2001

COVER FEATURE

Thinking Outside the Box at the IHMC



The IHMC's human-centered-computing approach to research embraces a closely interrelated collection of theory-based, yet highly practical, applications.

A decade ago, research into artificial intelligence came under fire from many sectors. Savaged by critics for being overhyped and failing to deliver on its promises, AI's name became so tarnished that many of its proponents began referring to it by other terms. Debates within the community itself further impeded progress and left many researchers feeling as if the discipline had lost its way.

Several projects now under way at facilities in Pensacola, Florida, may provide the spark to ignite an AI renaissance, one that can leverage renewed interest in applying the technology to next-generation interfaces, knowledge modeling and sharing, intelligent agents, data mining and—perhaps most significantly—remediating human cognition.

Founded by Kenneth M. Ford and Alberto Calais at the University of West Florida in 1979, the Institute for Human and Machine Cognition houses experts in computer science and engineering, medicine and cognitive psychology, statistics and mathematics, and the social sciences and philosophy. The IHMC has drawn scientists and researchers from these diverse backgrounds to study the complex phenomenon of human cognition and, ultimately, to develop cognitive prostheses that will augment our capabilities and overcome our limitations.

HUMAN-CENTERED COMPUTING

The IHMC itself came about when its founders realized that the existing work in computer science would happen in the boundary spaces between disciplines. Further, they noted, demand that the traditional, and in some ways accidental, need for academic specialization

would become increasingly counterproductive. The IHMC will base its research on the idea of leveraging and extending human thought through computers and computer programs. If we abandon the Turing Test as AI's measure of success, Ford notes, the goal naturally shifts from making artificial superhumans who can replace us to making superhumanly intelligent artifacts that can amplify and support our own cognitive abilities.

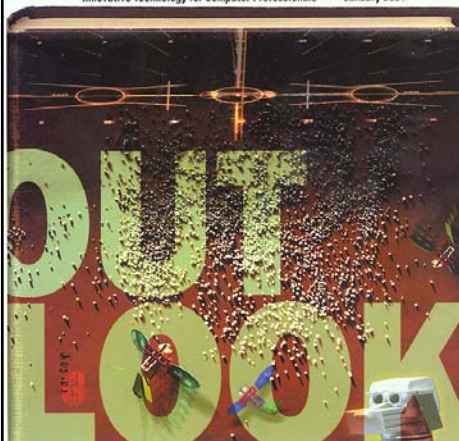
Cognitive prostheses

To understand cognitive prostheses, consider eyeglasses, a well-known ocular prosthesis. Eyeglasses leverage and extend our ability to see, but in no way model our eyes. They don't look or act like them and wouldn't pass a Turing test for being an eye. We can also look upon the screen itself as a muscular prosthesis that supplements even the strongest person's inherent physical limitations.

The IHMC wants to create the cognitive equivalent of eyeglasses—and to a lesser extent, prostheses, since perception is part and parcel of cognition. From this perspective, the common sense of discussion includes dryware, wetware, and the environment in which humans work.

Researchers at IHMC explore what's known about how humans function—specifically, how the eye or brain function—and start from first principles to build a total system that fits and includes the user. The prostheses metaphor implies the importance of designing systems that fit the human and machine components together in ways that synergistically exploit their respective strengths.

The IHMC's approach turns much traditional design philosophy on its head. For example, the dual



Scott Hamilton
Computer

Cyberprivacy
in the New
Millennium

The KWIC
and the Dead

Peer-to-Pee
Networking



A Look Ahead
at Society
Activities in
2001, p. 88

<http://computer.org>

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PARTICIPANTS

- Institute for Human and Machine Cognition
- IDEO
- John Frassanito & Associates
- Academic and NASA experts
 - Mars science
 - Computer science

IDEO



JOHN FRASSANITO & ASSOC



PROCESS

- Sequence of team meetings
- Draw up-on unique strengths of partners
 - Integration of medical, social, and computer science at IHMC
 - Innovative product design expertise of IDEO
 - Strategic visualization capabilities of JF&A
 - Mars science expertise of NASA and academic partners

PRODUCT

- Report-of course
- Visualization of the future
- Other as helpful and permitted by schedule and budget